Manaaki Whenua
Landcare Research

Representing Cultural Values in IDEAS

Prepared for

Stakeholders of the
Motueka Integrated Catchment Management Programme

Manaaki Whenua
Landcare Research

TDC Tasman District Council

CAWTHRON

May 2008

Representing Cultural Values in IDEAS

Motueka Integrated Catchment Management
(Motueka ICM) Programme Report

by

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INTRODUCTION

Among the developing integrative tools for ICM and for managing HELP basins is scenario modelling. Modelling incorporates visualisation methods and offers a powerful way to explore and 'see' future landscapes and catchments based on various forms of decision-making and desired input. The FRST programme Integrated Catchment Management (ICM) in Motueka has developed an integrated modelling framework called IDEAS – Integrated Dynamic Environmental Assessment System which can link many models together to assist stakeholders and tangata whenua (iwi and hapu) in decision-making by seeing, testing, and planning various future scenarios.

Two hui were carried out in April-May 2008 at Whakatu marae, Nelson, with Tiakina Te Taiao Ltd, a pan-iwi resource management organisation representing Te Tau Ihu iwi (tribes of the northern South Island), on 2nd April 2008, and again 13th May 2008. Tiakina is made up of four main iwi, Ngāti Rarua, Te Atiawa, Ngāti Tama, and Ngāti Koata, and was formally established in 2007 and is presently based at Whakatu marae, Nelson.

The hui were to ascertain how cultural values could be recorded, expressed, understood and incorporated into spatial futures or scenario modelling and whether iwi thought this was relevant and had application to their own research, planning and policy. The two hui were used to gain feedback on this research, its approach, its relevance, to seek design input and other comment. The first hui was held with a working group of iwi and hapu researchers and workers from Tiakina Te Taiao Ltd, while the second hui introduced this work to the Tiakina Te Taiao Ltd. board of directors. At both hui we discussed a software tool called ENVISION and how it could be used in scenario modelling research. Attendees at both hui are listed in Appendix 1.

At the two hui Oscar Montes de Oca Munguía presented the concept of IDEAS and introduced ENVISION, a tool that can produce future scenarios that reflect values and has the potential to include and evaluate cultural views in research, planning, and policy. The tool can weight the values being introduced and generate separate future scenarios accordingly, i.e., economic, social, environmental, and cultural.

The objective of both hui presentations was to present and receive feedback about the use of the IDEAS framework and ENVISION as a constructive planning and policy forming tool to facilitate, articulate and map cultural values and goals. The tool can also be used to generate and articulate future contrasts by illustrating tradeoffs between cultural environmental, social and economic values and goals.

This report outlines the main concepts discussed during both hui, and feedback received.

Cultural values

Cultural values are integral to Maori culture and values guide a person's preferences and priorities. Traditional concepts and beliefs have shaped the thinking of most Māori, and Maori knowledge – mātauranga Maori and traditional values (Marsden 1988; Barlow 1993; Mead 2004) still resonate strongly within contemporary Māori society. The word *tikanga* is used to denote the Māori body of rules and values that govern or shape human behaviour and some of the key cultural values include: *Tino Rangatiratanga* and *Mana Motuhake* – self-determination, independence or inter-dependence; *Mana Whenua* – rights of self governance, rights to authority over traditional tribal land and resources; *Whānaugatanga* – family connections and family relationships; *Kaitiakitanga* – guardianship of the environment; *Manaakitanga* – reciprocal and unqualified acts of giving, caring, and hospitality; *Arohatanga* – the notion of care, respect, love, compassion; *Awhinatanga* – assist for or care for; *Whakakoha* – the act of giving; *Whakapono* – trust, honesty, integrity;

Whakakotahitanga – respect for individual differences and participatory inclusion for decision making; *Wairua* – the spiritual dimension to life. Māori values can therefore be expressed in many forms.

Cultural values therefore reflect a long history and relationship tangata whenua have with a given area, location, catchment, or region and reflect their world view. Cultural values are statements of knowledge, and form perspectives about issues, shape the way Maori think about issues, form the basis for decision-making, finding solutions, and are fundamental for establishing aspirations, desires, and priorities.

Iwi and hapu in the Te Tau Ihu region have been active in recording and expressing their cultural values for many years. This work has been undertaken, for example, in many projects (Harmsworth 2003): on marae, through wānanga (workhops), hui (meetings), in the field, as part of resource management responsibilities, and under Treaty of Waitangi claims. Tiakina Te Taiao Ltd. has more recently been developing cultural and environmental methods and indicators (Harmsworth 2008) largely adapted from the Cultural Health Index (CHI) (Tipa & Teirney 2006a,b, 2003, 2002; Tipa, 1999). A large amount of information and knowledge has been recorded onto Geographic Information Systems (GIS) and Tiakina Te Taiao Ltd has been expertly building their capability in GIS over the last few years. This has provided a comprehensive tool not only for recording and documenting cultural values but with potential to spatially represent cultural values across landscapes at various scales, including the catchment scale. GIS is being increasingly used in planning and policy by iwi and hapū (Harmsworth et al. 2005) and is now a central tool for planning environmental and cultural projects, recording cultural values, used to record and document significant cultural, heritage, taonga, and archaeological sites, mapping, underpins cultural impact assessment, used for planning, recording and interpreting environmental and cultural indicators, central for resource consent analyses and processing, and produces maps for reports. This provides iwi and hapu with a great depth of knowledge and information for recording and expressing cultural values in various frameworks and models.

Results

From the two hui in April-May 2008, Tiakina Te Taiao Ltd. provided positive and constructive feedback about IDEAS and the use of ENVISION and there was a high degree of interest about how such a tool could be used. The first hui used an advanced level of conversation on the visualisation tool that could leverage existing iwi activities and projects such as drawing on matauranga Maori (Maori knowledge), defined cultural aspirations and goals, iwi policy and environmental/cultural standards, GIS information and knowledge, cultural values, and cultural indicators. The second hui was shorter and kept at a more general and strategic level. Both groups could see some value of new tools for resource management, policy work, and decision-making, in localised areas, catchments, and across the region.

It was agreed it was still unclear exactly how cultural values could be incorporated and articulated in such future scenario modelling but we generated interest and ideas. Both groups would like to see practical examples of how the scenario modelling could be used in the context of present iwi projects and operations. These examples could show tradeoffs between cultural, social, economic and environmental goals, priorities, and aspirations and allow iwi to use another tool that can be used to articulate cultural values during discussion and negotiation with groups such as: Central Government, Local Government, industry, research agencies, and community groups. This would require iwi researchers to continue work with ICM researchers over the next year to explore and demonstrate these concepts and tools.

HUI PRESENTATION AND DISCUSSION

IDEAS

IDEAS[a] was described as a framework of models within a learning process. Figure 1 shows how ENVISION can be used to assist conversations around future spatial options (defined by individual or group preferences or policies). ENVISION produces maps of Land Use-Land Change (LULC) projections that can be interpreted as "blueprints" of a vision or the intended consequences of the implementation of a policy. The resulting projected maps can then be used to run more accurate biophysical and economic models to quantify consequences of those LULC patterns and to analyse the assumptions and interpretations within the models.

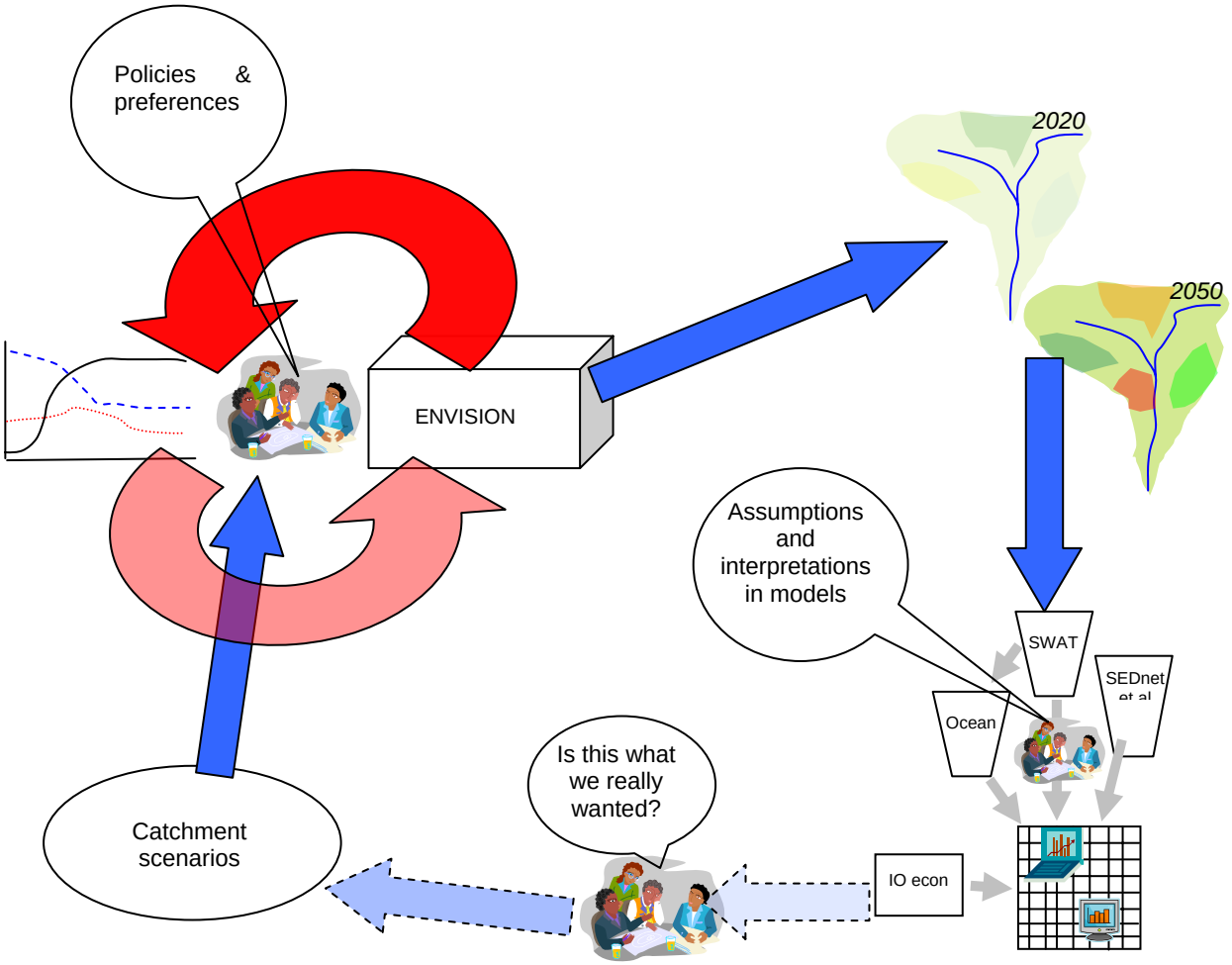

Figure 1. IDEAS Conversation Cycle.

[a] This conceptual diagram was only discussed at the hui, but it was presented at the 2nd IDEAS Stakeholder Meeting (14th April 2008).

Use of ENVISION in the ICM programme

ENVISION is an agent-based model (ABM) used in IDEAS to produce first-cut projections of land use-land change scenarios. Oscar's interest in tools like ENVISION fits with his research interests on the application of modelling to accommodate diverse viewpoints and encourage communication. Oscar made the analogy of ENVISION and the computer game SimCity, which after 20 years in the market is now incorporating values such as productivity, altruism and spirituality in order to customise the game to accommodate for diversity on user's values and preferences.

The intention of using ENVISION in the ICM programme is to put in perspective policy options by building a "more human" evaluating framework. That is, recognising diversity of perspectives, not only economic wellbeing or environmental health separately. In that respect, ENVISION could be used to "give a voice" to groups that do not necessarily have direct power to change land use (including future generations).

Metagoals and Altruism

ENVISION allows the customisation of an evaluating framework for policies or options that capture unique perspectives on evaluating criteria: economic, environmental, social and cultural metagoals. Meatgoals represent the goals defined for the entire system under analysis. The software is used to illustrate tradeoffs between these goals. Figure 2 shows an example of ENVISION weighting for the catchment's "metagoals" and the altruism and self interest simulation tool.

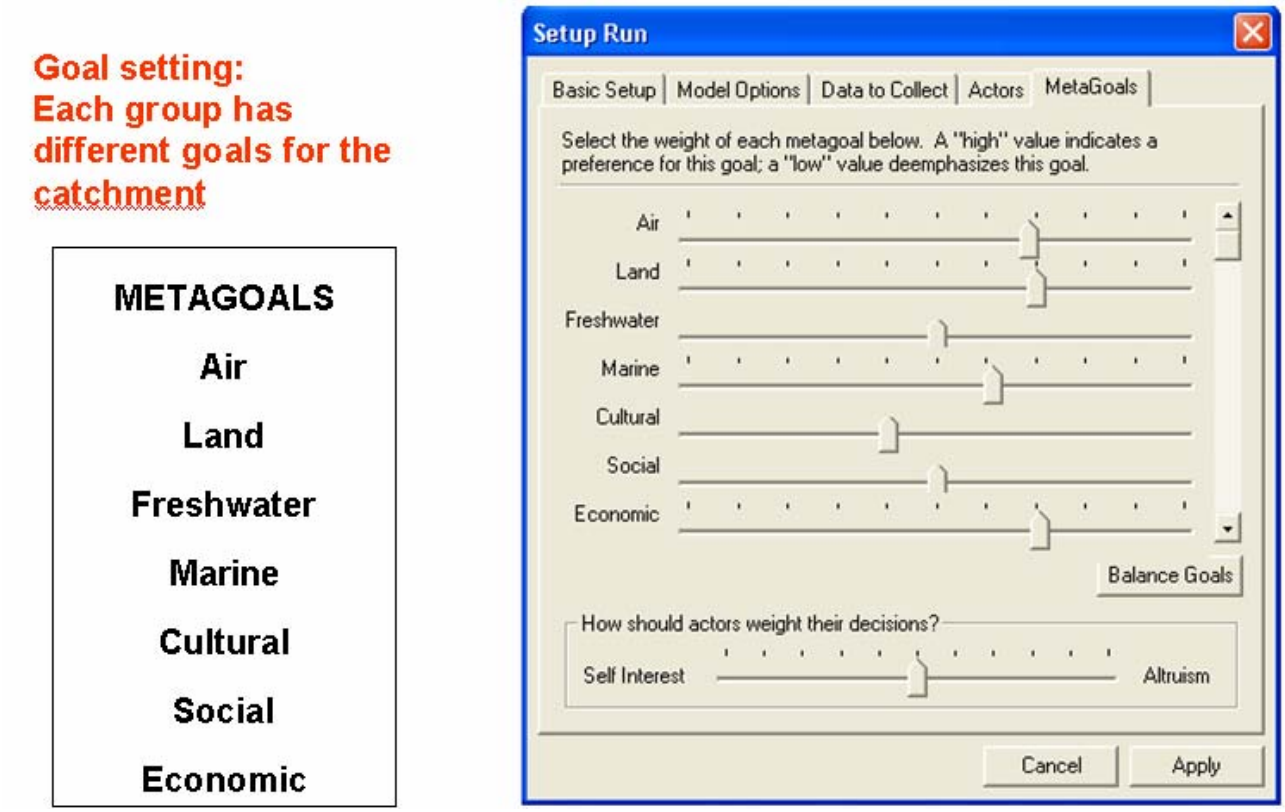

Figure 2. ENVISION Evaluative Framework Definition.

It was mentioned that ENVISION can be customised to simulate how decisions are made in the catchment and also how decisions are evaluated. It could be used as a vehicle for expressing the views and aspirations of diverse interest groups, and, in this case, Te Tau Ihu. Figure 3 shows an example of how the same LULC scenario can be run under two different ENVISION setups.

The left-hand side illustrates a setting in which a "balanced" weighting system is run. That is, economic, environmental and social goals are equally important. Decision makers are an equal mix of economically driven land owners and environmentalists. The graph at the bottom shows how, over 50 years, decisions were made to mainly improve the economic performance of the catchment. In contrast, the run in the right-hand side was setup to reward environmentally oriented land-use changes. The "altruism" level of decision makers was also altered, meaning that economically driven land owners were influenced by the overall catchment's vision. As a result, most decisions were made to improve environmental conditions, as illustrated in the graph below.

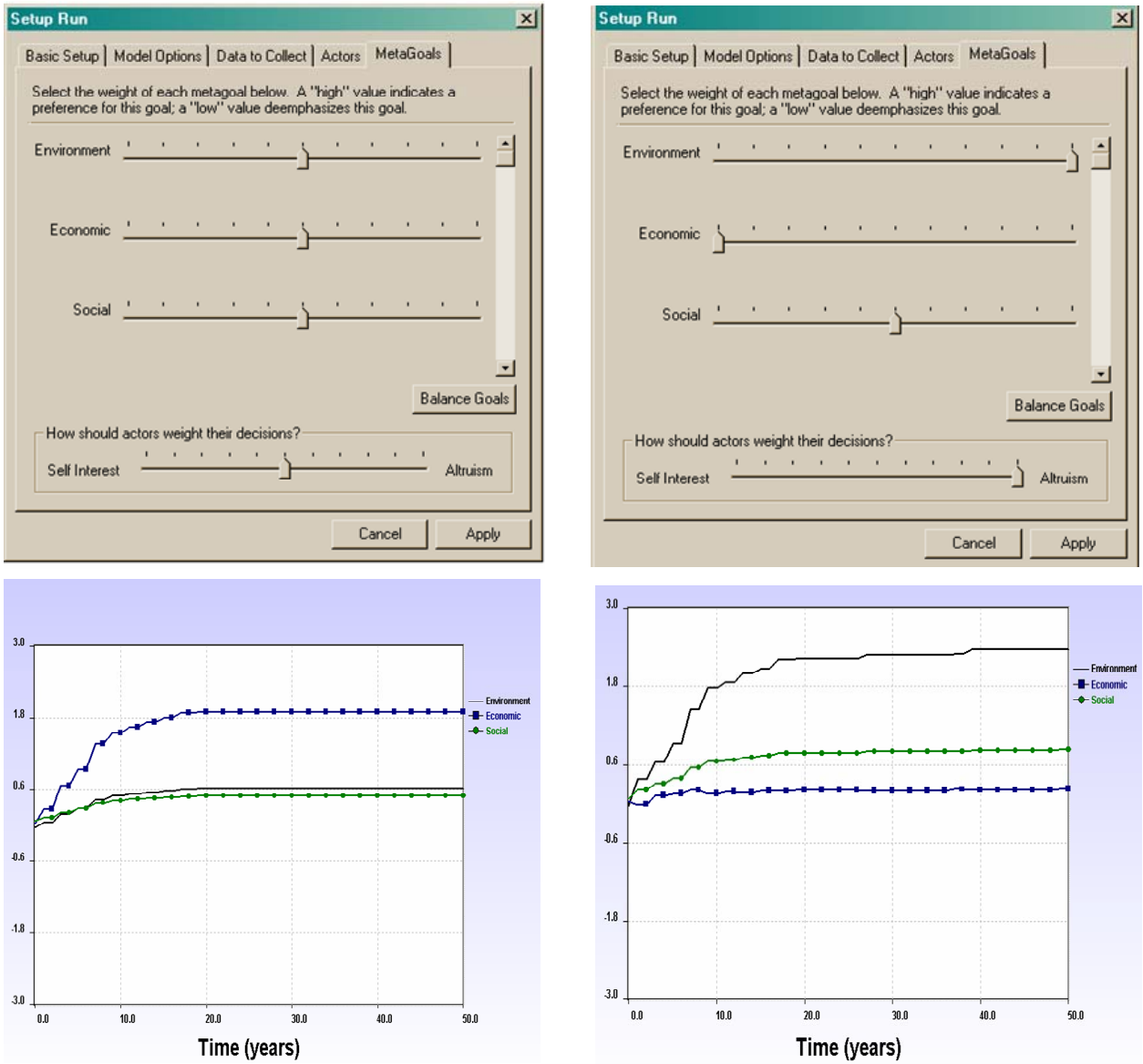

Figure 3. Same LULC scenario run under two metagoals weighting.

This crude example was used to explain the use of ENVISION as a tool to create "blueprints" of organisations, interest groups or communities' long term views. Oscar mentioned how in order to build a house, or even undertake house renovations, a blueprint was always required. This was contrasted with the area of policy design and implementation, in which visualisation of intended consequences is rarely provided.

Actors

The concept of Actors within ENVISION was presented. Figure 4 illustrates how the software allows for the simulation of several types of decision makers. In this case, 4 actor types have been defined and allocated to the properties identified in the catchment. The values and preferences of actors can be defined individually or as a group, for which probability distributions of preferences for each goal can be defined. It was explained that this capability of ENVISION is not currently being used.

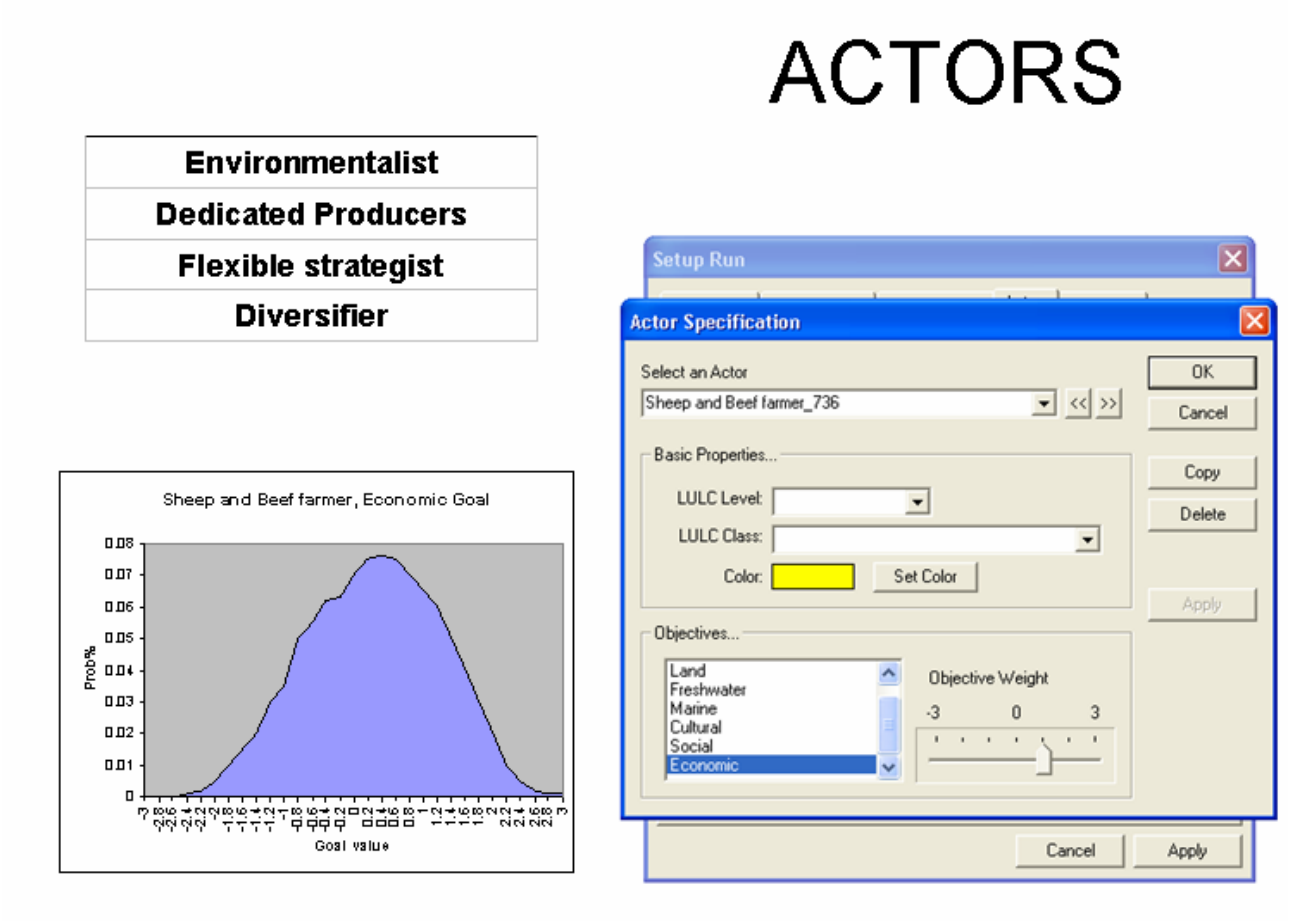

Figure 4. Actor definition.

ENVISION demonstration

There was a demonstration of the software. Figure 5 illustrates the maps currently used to define the Individual Decision Units: Top left: Land Use Capability, top-right: Current Land Use, Bottom: Agribase property boundaries for the whole catchment and lower catchment detail.

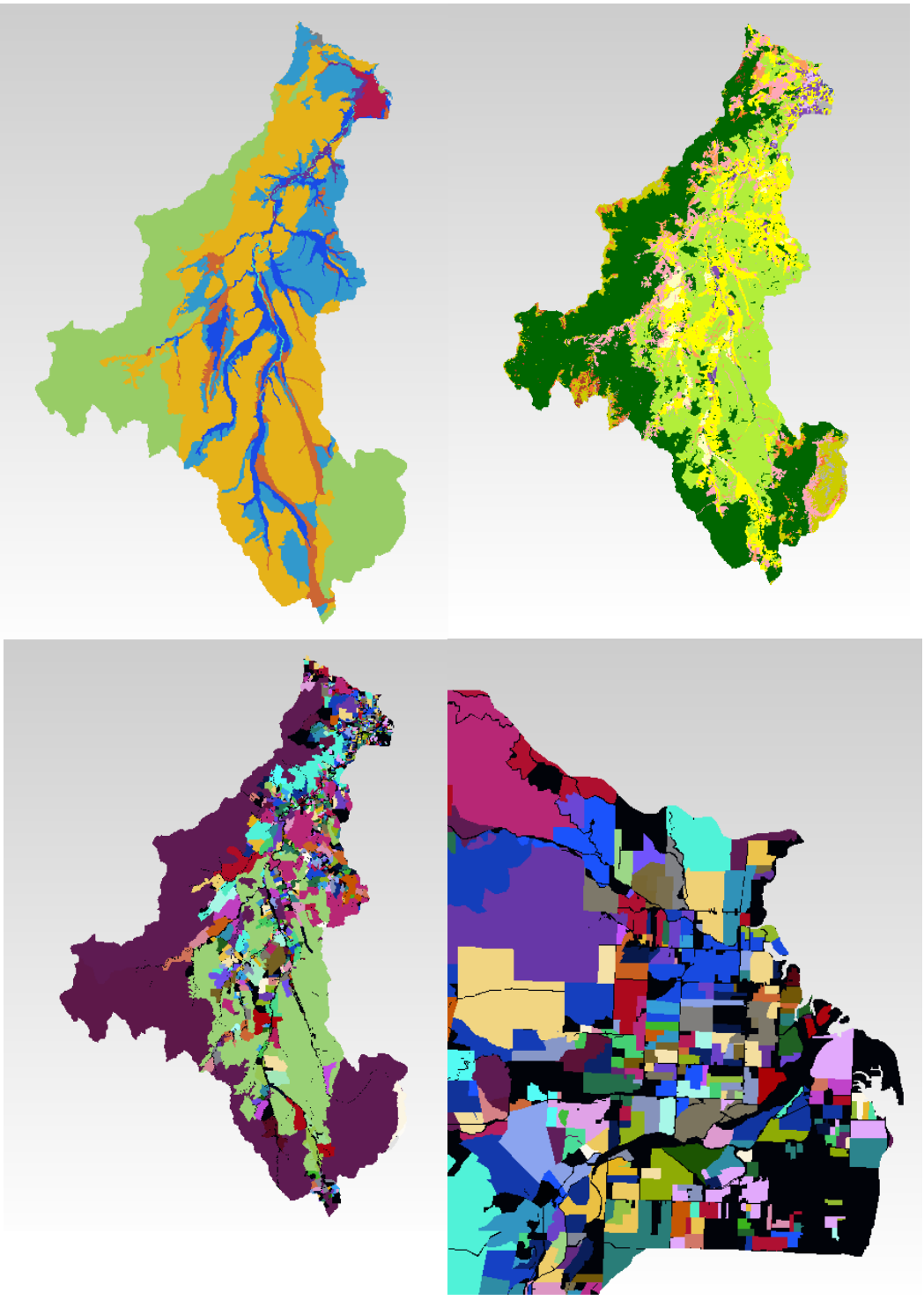

Figure 5. Individual Decision Unit definition.

Discussion and feedback

The main discussion centred on the way scores are calculated for each land use options in ENVISION. It was explained that other IDEAS models provide with a series of biophysical, economic and social scores for some of the current land uses we are representing in the catchment, but that there are gaps of information in key areas. Table 1 shows an IDEAS spreadsheet summarising some of the indicators for each land use.

Table 1. IDEAS coefficient summary.

Land class	Current area (ha)	N(kg/ha/yr)	Sed (t/km2/yr	Output ($/ha/yr)	jobs/100 ha	max. water take (m3/ha/wk)	Gross margin ($/ha/yr)	Carbon sink rate (t/ha/yr)
urban	561	0	37	0	0	0	0	0
bare ground	2292	0	185	0	0	0	0	0
alpine herbfield	991	0	185	0	0	0	0	0
water	316	0	0	0	0	0	0	0
cropland	597	20	224	2000	5	300	1000	0
vineyards	1	20	217	6000	25	180	3000	0
orchards	2245	20	249	6000	25	350	3000	0
sheep/beef	31046	1.02	490	567	0.5	0	432	0
tussock grassland	10590	0	69	0	0	0	0	
wetland plants	99	0	69	0	0	0	0	
scrub	17280	1	69	0	0	0	0	2
broadleaved indigenous hardwoods	3833	1	69	0	0	0	0	2
subalpine shrubland	2502	0	69	0	0	0	0	
exotic forestry	56538	2	84	500	0.25	0	450	8
indigenous forest	83397	1.58	69	0	0	0	0	0
dairy	3781	43.68	425	2976	5	350	2608	0
deer	1725	1.02	627	600	5	0	420	0

It was mentioned that economic benefits from natural state land uses require to be populated. It was also discussed that the urban coefficients should also be estimated. Oscar clarified that the social component cannot be narrowed to number of jobs created, but that this spreadsheet should be expanded as more information becomes available.

Figure 6 shows how the coefficients are grouped and normalised to be used for a run in ENVISION. There was discussion around the reasons for normalising some indicators in order to "compare apples with apples" if cultural and other goals would be compared against economic and environmental goals. It was also pointed out that there is no cultural 'coefficient' defined for any of the possible land uses.

	Air	Land	Freshwater			Marine		Cultural	Social	Economic	
Evaluative Models for EVOLAND	Carbon sink rate (t/ha/yr)	Area of natural ecosystems (ha)	N(kg/ha/yr)	Sed (t/km2/yr	max. water take (m3/ha/wk)	N(kg/ha/yr)	Sed (t/km2/yr	Empty	jobs/100 ha	Output ($/ha/yr)	Gross margin ($/ha/yr)
	100%	**100%**	**33%**	**33%**	**34%**	**60%**	**40%**	**100%**	**100%**	**50%**	**50%**
Direction of indicator	**max**	**max**	**min**	**min**	**min**	**max**	**min**	**max**	**max**	**max**	**max**
Min	-	-	-	-	-	-	-	-	-	-	-
Max	8	100	44	627	350	44	627	100	25	6,000	3,000
Land use											
urban	0	0	100	94	100	0	94	50	0	0	0
bare ground	0	0	100	70	100	0	70	50	0	0	0
alpine herbfield	0	100	100	70	100	0	70	50	0	0	0
water	0	100	100	100	100	0	100	50	0	0	0
cropland	0	0	54	64	14	46	64	50	20	33	33
vineyards	0	0	54	65	49	46	65	50	100	100	100
orchards	0	0	54	60	0	46	60	50	100	100	100
sheep/beef	0	0	98	22	100	2	22	50	2	9	14
tussock grassland	0	100	100	89	100	0	89	50	0	0	0
wetland plants	0	100	100	89	100	0	89	50	0	0	0
scrub	25	0	98	89	100	2	89	50	0	0	0
broadleaved indigenous hardwoods	25	100	98	89	100	2	89	50	0	0	0
subalpine shrubland	0	100	100	89	100	0	89	50	0	0	0
exotic forestry	100	0	95	87	100	5	87	50	1	8	15
indigenous forest	0	100	96	89	100	4	89	50	0	0	0
dairy	0	0	0	32	0	100	32	50	20	50	87
deer	0	0	98	0	100	2	0	50	20	10	14
bmp cropland	0	0	54	64	57	46	64	50	20	33	33
bmp vineyards	0	0	54	65	74	46	65	50	100	100	100
bmp orchards	0	0	54	60	49	46	60	50	100	100	100
bmp sheep/beef	0	0	98	77	100	2	77	50	2	9	14
bmp dairy	0	0	31	66	49	69	66	50	20	50	87
bmp deer	0	0	98	70	100	2	70	50	20	10	14

Figure 6. Score definition in ENVISION.

Cultural frameworks

Maori often express and articulate matauranga Maori (Maori knowledge) and cultural values in various Maori-based meaningful frameworks. These can be derived from and based on, for example, Atua (departmental gods), kaupapa (a Maori framework, concept, perspective, or philosophy), time using whakapapa (ancestral lineage showing interconnection with all living and non- living things), kaupapa Maori research methods (developed by Maori for Maori), and other frameworks based on Maori knowledge and world view.

Tiakina Te Taiao Ltd. researchers have been developing frameworks and indicators for their natural environments – to make sense of and interpret these environments – using Atua domains (Figure 7). The Atua domain framework has been successfully used in a number of iwi projects, cultural impact assessments and for the development and monitoring of cultural indicators. The frameworks are used to collect information and knowledge (e.g., indicators) as well as report and visualise that knowledge and information (e.g., GIS).

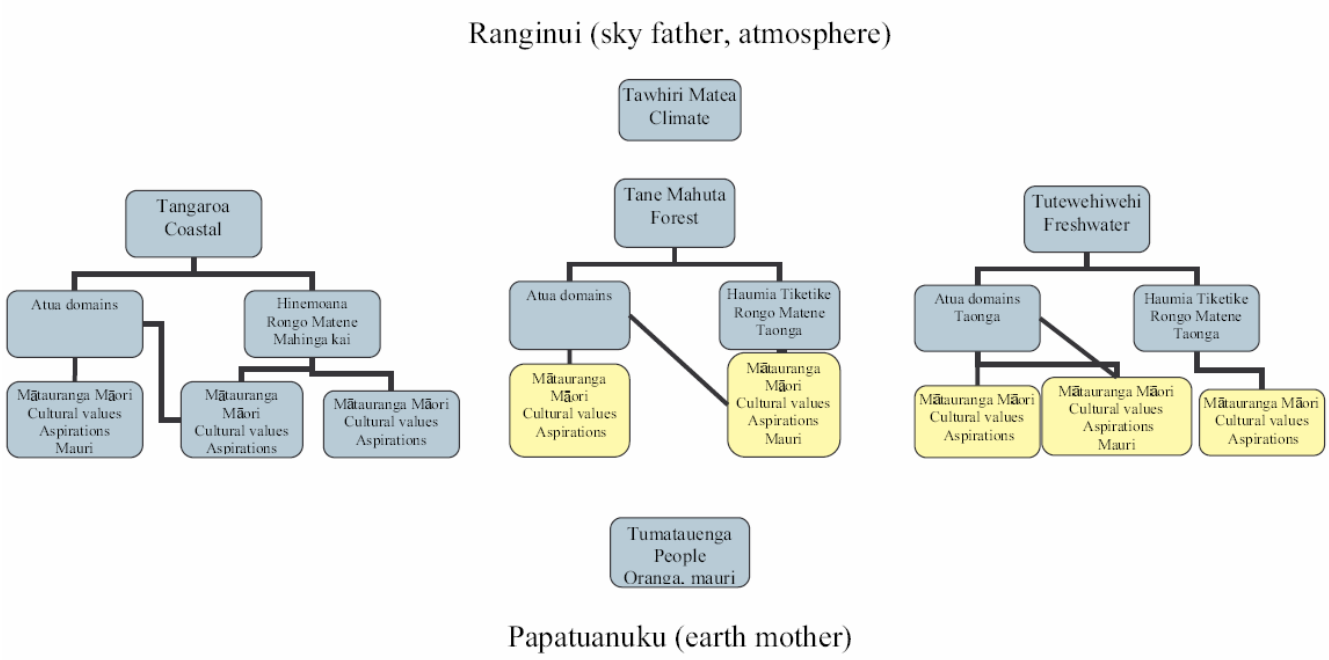

Figure 7. Atua (departmental gods) domain framework Source: Tiakina te Taiao, Dean Walker.

The Atua domain framework

From a traditional Māori perspective, the origin of the universe and the world can be traced through a series of ordered genealogical webs, which go back hundreds of generations to the beginning. This genealogical sequence is referred to as *whakapapa*, and places Māori in an environmental context with all other flora and fauna and natural resources as part of a hierarchical genetic assemblage with identifiable and established bonds. As part of this ancestry, a large number of responsibilities and obligations were conferred on Māori to sustain and maintain the wellbeing of people, communities and natural resources. W*hakapapa* follows a sequence beginning with the nothingness, the void, the darkness, a supreme god, emerging light, through to the creation of the tangible world, the creation of two primeval parents, *Ranginui* – the sky father, and *Papatuanuku* – the earth mother. The two primal parents gave birth to a large number of supernatural beings, *Atua,* who became responsible guardians for different parts of the natural and spiritual environment. In a plan carried out by the Atua children to create light and flourish, the parents were prised apart. The

separation of the parents led to *Ranginui* forming the sky, resulting in the rain as he continued to weep for his separated wife *Papatuanuku* who formed the land providing the sustained nourishment for all her children. Many environments are still viewed and understood by Māori in this context. Some of the main domains with their Atua names (Best 1924a, b; Hiroa 1950; Barlow 1993; Te Puni Kokiri 1993) include:

Ranginui	The sky father = Sky, Air and Airspace (above the earth)
Papatuanuku	the earth mother = Land, landforms, mountains, hills, floodplains, soils etc.
Tane Mahuta	The god of the forests, all living things within them, and human life
Tawhirimatea	The god of winds and storms
Ruaumoko	The god of earthquake and volcanoes
Tane Mahuta	The god of forests, forest creatures
Tangaroa	The god of seas, all sea creatures, and reptiles – Inland and coastal water. His grandchildren, Ikatere gave rise to fish, and Tutewehiwehi to reptiles and freshwater streams
Rongomatane	The god of agriculture, sweet potato, responsible for all cultivated foods
Haumiatiketike	The god of uncultivated foods, natural vegetation used as a food source
Haumiatiketike	The god of fern roots and other wild foods
Tumatauenga	The god of humanity and war
Tawhirimatea	The god of winds and all other metereological phenomena
Tutewehiwehi	Mokopuna (grandson of Tangaroa) – inland waterways, lakes, creeks, rivers.streams, wetlands.

Applications of modelling futures

During both hui, there was general discussion about how tools such as ENVISION could incorporate cultural values and be used to communicate and visualise future scenarios and tradeoffs between cultural, social, economic, and environmental scenarios. Contrasting examples were shown between a strong economic development emphasis versus a more conservation founded environmental emphasis (Figure 3). Cultural values tend to be intrinsic through economic, social and environmental goals and aspirations but can influence different weightings accordingly. ENVISION can therefore be used to show what happens when cultural, social, economic, and environmental parameters, priorities, and goals are weighted differently at various spatial scales, especially at the catchment, using social, environmental and economic data from the Motueka catchment. Cultural values can be expressed and explained using an Atua domain framework. Examples of tradeoff or weighting were shown at the two Tiakina hui to show marked differences in catchment land use and offsite environmental effects when comparisons were made between a strong economic development focus (e.g. intensification of land use and urbanisation) versus a mainly environmental focus (e.g. conservation and sustained forest cover). Iwi could therefore use ENVISION to weight their preferred goals, priorities and standards using cultural values that influence each of the social, economic, and environmental criteria, and then generate and visualise various future landscape scenarios and consequences. This tool could be useful in articulating cultural values and aspirations during discussion and negotiation with groups such as: Central Government, Local Government, industry, research agencies, and community groups.

Atua framework example

Internally for iwi and hapu modelling tools could use the Atua framework to convey and explain concepts and values to each other, and this would help with understanding and explaining cultural values and mātauaranga Māori from a Maori worldview. An example of how ENVISION could be used to illustrate the tradeoffs between cultural, social, economic and environmental goals, using the Atua framework to explain these scenario differences is shown in Figure 8.

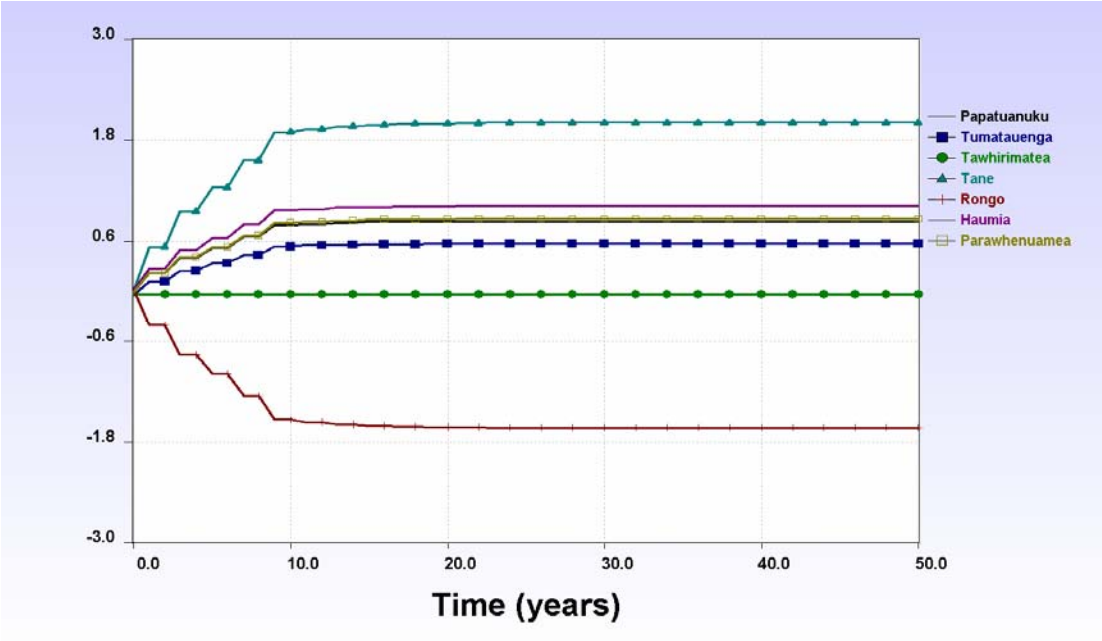

Figure 8. An interpretation of tradeoffs between economic, environmental and social goals expressed through atua domains for a land use change scenario over 50 years using the software ENVISION

CONCLUSIONS

Tiakina Te Taiao Ltd. provided positive and constructive feedback about IDEAS and the use of ENVISION and there was interest about how such a tool could be practically used. The iwi research and working group would like to know more about how to use the tool, how to record cultural data into the spreadsheet, use and change the scenarios, and be further involved in helping with the incorporation of cultural values into IDEAS and ENVISION. The present work in GIS has given them an appreciation of the application and power of visualisation and mapping tools. They see the main value of new tools for resource management, policy work, and iwi projects, particularly helping with the articulation, expression, and communication of their cultural views during discussion and negotiation with groups such as: Central Government, Local Government, industry, research agencies, community groups and possibly with other iwi and hapu.

It was concluded that further collaborative research work with iwi researchers will be required in order to make ENVISION work for Tiakina Te Taiao Ltd. It was agreed the best approach would be work with iwi researchers and to generate iwi-relevant examples that demonstrate how cultural values can be incorporated into future scenario modelling. Practical iwi examples could then be used to alter and explain tradeoffs between cultural, social, economic and environmental goals, priorities, and aspirations. This work is therefore seen as ongoing.

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Appendix 1:

First hui – Tiakina te Taiao iwi and hapu researchers and workers
Whakatu marae, 2nd April 2008:
Dean Walker (Tiakina, GIS management, Projects Manager)
Cherie Tawhai (Tiakina Administrator)
Pat Park (Te Atiawa)
Moetu Stephens (Ngāti Tama)
Darren Horne
Justin Kere

Oscar Montes de Oca Munguía
Garth Harmsworth

Second hui – Tiakina te Taiao Board of directors
Whakatu marae, 13th May 2008:
Barney Thomas (NRAIT)
John Morgan(Ngāti Rarua)
Harvey Ruru (Te Atiawa)
Mike Ingram (Wakatu)
Allen Hippolite (Ngāti Koata)
Moetu Stephens (Ngāti Tama)
Ann Sheridan (Tiakina Resource Management Manager)
Cherie Tawhai (Tiakina Administrator)

Oscar Montes de Oca Munguía
Garth Harmsworth

Useful links:

The ICM programme
http://icm.landcareresearch.co.nz/

IDEAS
http://icm.landcareresearch.co.nz/research/research.asp?theme_id=5&research_id=67

ENVISION
http://envision.bioe.orst.edu/